AMENDMENTS TO THE CLAIMS

1. (Currently amended) An apparatus for positioning a polymer in a microchannel, which comprises:

a polymer carrier fluid including at least one polymer;

a microchannel having first and second ends ~~and substantially opposed sidewall~~, the microchannel being constructed and arranged to transport [[a]] the polymer carrier fluid such that, when present, the polymer flows from the first end toward the second end in a laminar flow stream;

a first section of the microchannel disposed between the first and second ends of the microchannel~~, the~~ and having a first set of substantially opposed funnel shaped sidewalls ~~of the first section~~ constructed and arranged to create a first velocity gradient in the flow stream passing there through;

opposed flow control channels in fluid communication with the microchannel, the flow channels being positioned between the first section and the second end of the microchannel;

a flow controller to control the flow of fluid through the opposed flow control channels to maintain the flow stream containing the polymer in a laminar state isolated from the substantially opposed sidewalls of the microchannel at points downstream from the opposed flow control channels;

a second section of the microchannel disposed between the opposed flow control channels and the second end of the microchannel, the second section having a second set of substantially opposed funnel shaped sidewalls ~~of the second section being~~ constructed and arranged to create a second velocity gradient in the flow stream passing there through; and

a detection zone disposed within the microchannel.

2. (Original) The apparatus of claim 1 wherein the flow controller is adapted to move the polymer into the detection zone.

3. (Original) The apparatus of claim 1 wherein the flow controller comprises at least two flow controllers, each of the at least two controllers for independently controlling the flow of fluid through each of the opposed flow control channels.

4. (Original) The apparatus of claim 1 wherein the flow controller comprises a pressure source.

5. – 6. (Cancelled)

7. (Currently amended) The apparatus of claim 1 wherein the second velocity gradient ends upstream of the detection zone by at least a distance equal to a length of the polymer.

8. (Original) The apparatus of claim 6 wherein the polymer is DNA.

9. (Original) The apparatus of claim 7 wherein the polymer is RNA.

10. (Original) The apparatus of claim 7 adapted to create a fluidic boundary between the carrier fluid an the flow through the opposed flow control channels wherein the opposed flow controller is further adapted to control a shape of the fluidic boundary.

11. – 22. (Cancelled)

23. (Currently amended) An apparatus for elongating a polymer which comprises:

a polymer carrier fluid including at least one polymer;

a microchannel having first and second end, a polymer elongation zone, and opposed sidewalls, the microchannel being constructed and arranged to transport [[a]]the polymer carrier fluid such that, when present, the polymer flows from the first end toward the polymer elongation zone in a laminar flow stream;

a first set of substantially opposed funnel shaped walls positioned at the first end and constructed and arranged to create a first velocity gradient in the flow stream of the carrier fluid passing therethrough;

opposed flow control channels in fluid communication with the microchannel through the opposed sidewalls, the flow control channels being positioned between the first set of substantially opposed funnel shaped walls ~~end of the microchannel~~ and the polymer elongation zone, such that the flow stream of the carrier fluid is isolated from the opposed walls of the microchannel when additional fluid is introduced to the microchannel through the opposed flow control channels;

opposed polymer control channels in fluid communication with the microchannel through the opposed sidewalls, the polymer control channels defining therebetween the polymer elongation zone and being positioned between the opposed flow control channels and the second end of the microchannel;

a first end fluid controller for directing a fluid through the microchannel from the first end toward the polymer elongation zone;

an opposed flow controller for controlling the flow of fluid through the opposed flow control channels to maintain the flow stream containing the polymer in a laminar state isolated from the opposed sidewalls of the microchannel;

an opposed polymer channel controller for controlling the flow of fluid through the opposed polymer control channels, and

a second end flow controller for directing fluid through the microchannel from the second end toward the polymer elongation zone.

24-29. (Cancelled)

30. (Currently amended) An apparatus for maintaining a polymer in an elongated configuration which comprises:

a microchannel constructed and arranged to contain a polymer in a carrier fluid, the microchannel having opposed sidewalls defining a first microchannel width, and a plurality of

positions defining a second microchannel width[[,]] that is smaller than the first width~~, and a transition between the first and second microchannel widths~~;

wherein ~~the~~ transitions between each of the opposed side walls defining the first microchannel width and each of the plurality of positions that define the second microchannel width ~~adapted to~~ contact and inhibit relaxation of ~~an~~ a stationary elongated polymer ~~contained within the first microchannel width~~ when the polymer extends between the plurality of positions.

31. (Currently amended) An apparatus for elongating a polymer and maintaining the polymer ~~it~~ in an aligned or elongated configuration the apparatus comprising:

a microchannel having first and second ends, a polymer elongation zone, and opposing sidewalls, the microchannel being constructed and arranged to transport a polymer in a carrier fluid such that, when present, the polymer flows from the first end toward the polymer elongation zone in a laminar flow stream;

opposed polymer control channels in fluid communication with the microchannel through the opposing sidewalls, the polymer control channels adapted to provide a flow of fluid for defining the polymer elongation zone, the polymer control channels positioned between the first end and the second end of the microchannel, wherein at least one of the polymer control channels includes ~~at least one~~ a plurality of transitions to a narrower microchannel width, the transitions for contacting and inhibiting relaxation of ~~an~~ a stationary, elongated or aligned polymer contained in the narrower width, and further wherein at least one of the polymer control channels includes at least one serpentine bend to cause at least one portion of the polymer control channel to be located adjacent and parallel to another portion of the polymer control channel;

a first end fluid controller for directing a fluid through the microchannel from the first end toward the polymer elongation zone;

an opposed polymer channel controller for controlling the flow of fluid through the opposed polymer control channels; and

a second end fluid controller for directing fluid through the microchannel from the second end toward the polymer elongation zone.

32. – 51 (Cancelled)